1 The Monitor

Larger displays from recognized manufacturers will give you better results, because they allow you to better see on the screen what you'll get in a printout. They also support a wider range of resolutions.

This Apple ColorSync Display provides a 20-inch screen (19.02-inch diagonal viewable image size). It's the ideal choice for anyone whose work demands resolution flexibility, color accuracy, and a full two-page display for detailed documents. Courtesy of Apple.

Dot Pitch

All CRT displays use an electron beam that scans the screen which is covered with dots of colored phosphor. Between the electron gun and the screen is a mask that allows the sweeping beam to strike the screen only in selected areas (pixels). There are two kinds of masks; shadow masks and slot masks.

- A **shadow mask** is a screen drilled with holes.The closer these holes are together in this screen, the higher the screen's resolution.
- A **slot mask** (or aperture grill), like those in Sony Trinitron tubes**,** uses slots cut in the plate instead of round holes.

The spacing between the center of one dot or slot of the same color is called the **dot pitch** and is given in millimeters. The closer these are together, the better the screen's display (all other things being equal). The images are crisper and edges and lines look smoother. To compare monitors with the different types of masks, you need to know that the numbers are not equivalent. For example, a monitor using a shadow mask and having a dot pitch of .27mm is about the same as a .25 mm dot pitch on a monitor using a slot mask. You can determine a monitor's maximum resolution by dividing its width by its dot pitch. For example, a 14", .28mm dot pitch monitor measuring 300mm across could clearly display 1071 dots.

Dot pitch isn't a reliable measure of monitor quality because it's often distorted by different measurement techniques. Some monitors, such as the Sony Trinitron, use stripes instead of dots so there is no comparable measurement.

Resolution

On any given monitor, changing screen resolutions changes the size of displayed objects such as icons, text, buttons, and images. As the resolution increases, object sizes decrease but they do appear sharper. Take a look here at the same image displayed at three different resolutions: 640 x 480, 600 x 800, and 1024 x 768.

640 x 480. At this resolution, Photoshop fills the screen.

800 x 600. When the screen resolution is increased, Photoshop gets smaller.

1024 x 768. When the resolution is increased again, Photoshop gets even smaller.

Because higher resolutions make things smaller on the screen, not all screen resolutions on a given sized screen make for comfortable viewing. For example, a screen resolution of 1024 x 768 on a 14" monitor makes text too small to be easily read. On the other hand, using a resolution of 640 x 480 on a 21" monitor makes things unreasonably large for those with normal vision (but like a large-print edition for folks with vision problems). Here is a table that you can use as a guideline when selecting a monitor or changing the resolution of the one you have.

Resolution	Monitor Size				
	14	15	17	20	21
640 x 480	X				
800 x 600	X	X			
1024 x 768		X	X	X	
1280 x 1024				X	X
1600 x 1200					X

White Point

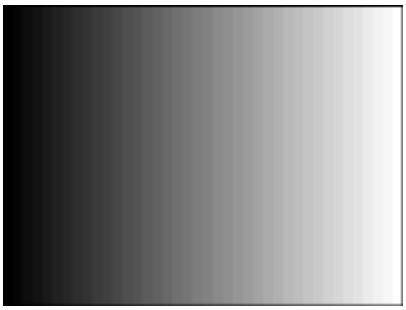
Light sources have different color temperatures. When you set up your monitor, you can adjust its "white point" which is another name for its

color temperature. The monitor's white point has a big effect on how the image looks on the screen. It's best to match it to the way you'll finally output the image so you can preview the end results better. If your images will be displayed on a monitor set it to 9300K, and if they are to be displayed on a TV set it to 6500. If they are to be printed, set it to 5000.

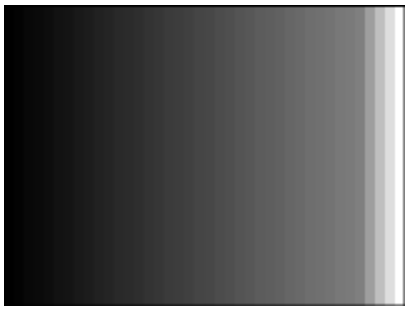
Source Color	Temperature
Computer monitor	9300K (adjustable)
Average daylight	6500K
Television monitor	6500K
Cool white fluorescent	4300K
Tungsten lamp	2800K
Sunlight at sunset	2000K

Gamma Correction

The image sensor in a digital camera is a linear device—the output signal is directly proportional to the scene illumination and exposure—doubling the exposure doubles the output signal. However, the phosphors that are used to make display monitors are non-linear. Typically, the phosphors have less gain for dark signals and more gain for bright signals. As the input voltage is increased, the screen brightness doesn't change smoothly because it's affected by electrostatic effects in the electron gun. This means that if you input a linear signal, the display on the screen is nonlinear and images tend to be darker with detail lost in the shadow areas.To compensate for this, the monitor adjusts the input signal to boost the dark areas and reduce the light ones. This ensures that combination of camera and monitor working together produce a linear effect. This process of adjusting the incoming signal is called **Gamma correction**. The term Gamma comes from the fact that the screen's brightness is proportional to the input voltage raised to the power 2.5, or **gamma**.



Input Image



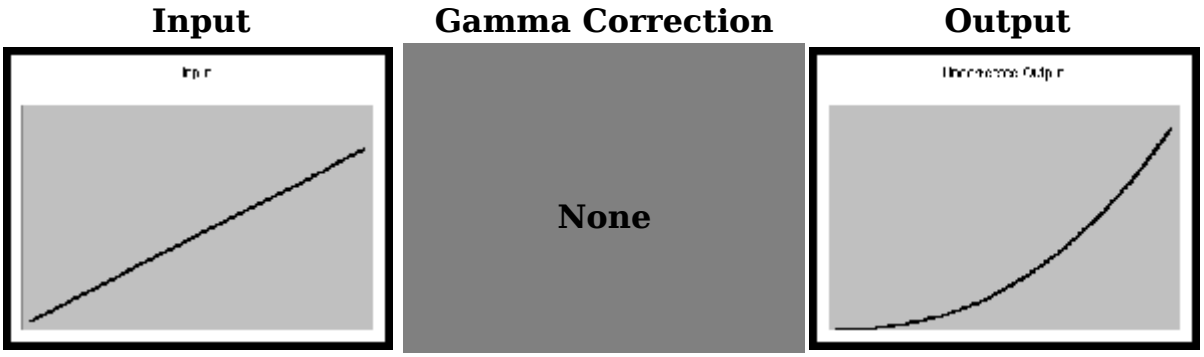
Uncorrected output image

To make the displayed image better match the original image, the input signal can be adjusted to distort the signal in the opposite direction from the distortions of the CRT. For example, if the original image has a

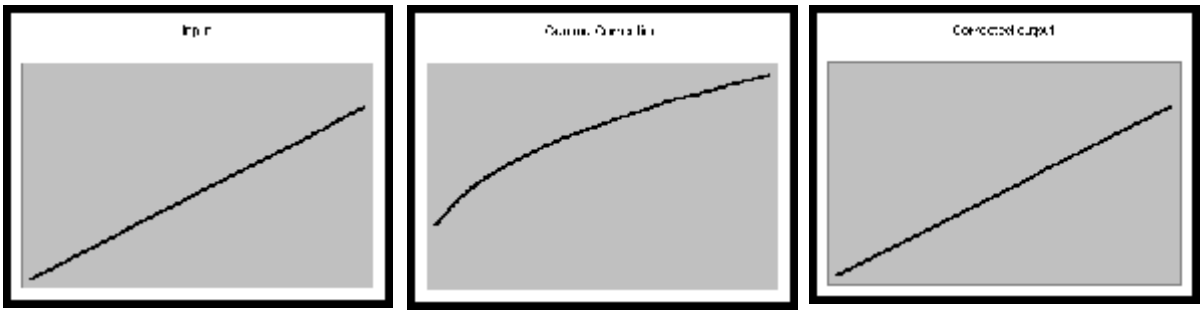
middle gray tone, the correction lightens it. When it's then displayed on the screen, the CRT darkens it again, bringing it back to middle gray. This adjustment is called **gamma correction**. Gamma correction controls the overall brightness of an image and images that haven't been properly corrected will look too light or too dark. Varying gamma also affects colors by changing the ratios of red, green, and blue. For this reason, you need to correct it to accurately reproduce colors.

Most monitors have a gamma of about 2.5. In the art below you'll see that a CRT with a gamma of 2.5 has a response like the one shown in the top two charts. In the bottom three charts you see what happens to the output signal when the input signal is first corrected.

Although gamma correction sounds technical, it's important if you want images displayed accurately on your screen or if you want to post images on the Web and have them displayed correctly on other people's screens.



1. The input curve is straight and linear. *2. No gamma correction is used.* *3. The output curve is distorted.*



1. The input curve is straight and linear. *2. Gamma correction adjusts the input in such a way that it compensates for the distortion.* *3. The output curve is straight and linear.*